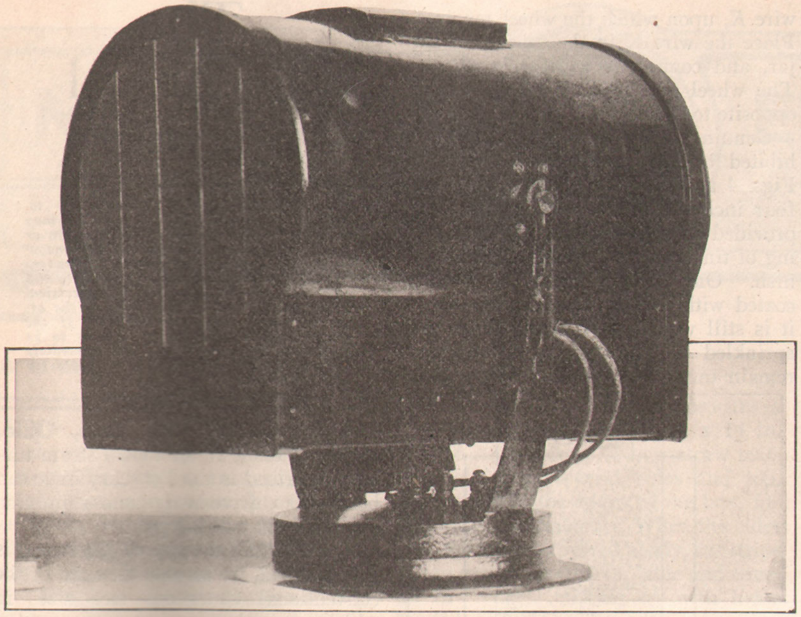


The completed searchlight with its hood

The lamp is turned by a shaft which runs through the center of the base. The shaft is provided with a gear at one end that meshes with two gears placed on the bottom of the lamp house. When the shaft in the center of the base is turned, the other two gears will revolve concentrically about it and thereby cause the lamp to turn.

If the arc is thrown out of adjustment, a very serviceable flood-light is made. When properly mounted, the lamp will also prove useful for amateur theatrical purposes.

Experimental Apparatus for Use With a Static Machine

By Harold Hymans

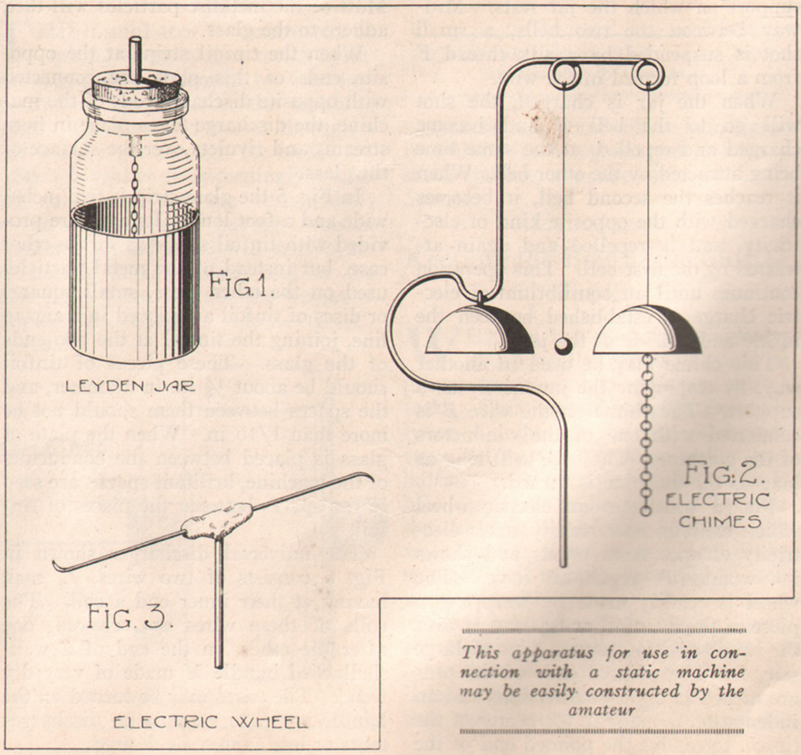
MANY experimenters possess a Wimshurst or Static influence machine, but unless it is provided with accessories very few experiments can be performed. The apparatus described in the ensuing paragraphs is easily made and not only adds to the equipment of the "lab," but will enable the builder to perform many interesting and instructive experiments. Every fellow who has put his static machine on the shelf should take it down, dust it carefully, and make these accessories for it.

First of all, three Leyden jars should be constructed—two to be used in connection with the machine and one for general use. They may all be of one size and of similar construction.

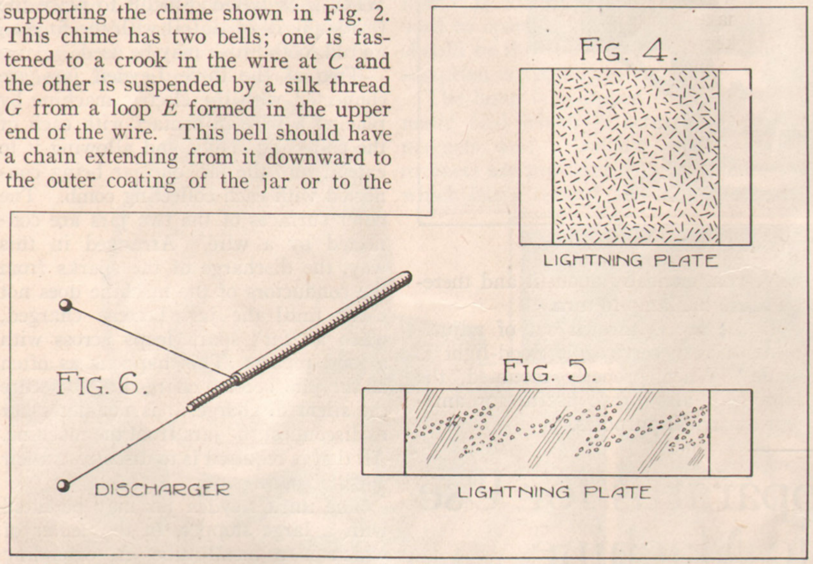
Obtain a glass jar similar to that shown in Fig. 1; clean it thoroughly inside and out, and permit it to dry. Varnish both the inside and outside of the jar with a thin coat of shellac varnish. The varnish prevents the charge from creeping over the glass in damp weather. Cut a circular piece of thin tinfoil that will fit the bottom of the jar on the inside; cut a larger piece to cover the bottom on the outside. Varnish them with shellac on one surface, and when the varnish is nearly dry—that is, when it becomes tacky—place each piece of tinfoil where it belongs; varnished side toward the glass. Now cut two strips of tinfoil with a width that is equal to one-half the height of the jar and long enough to reach around the jar. Varnish these strips on one side with shellac varnish, and, when almost dry, place one strip against the inner surface of the jar with its lower edge touching the tinfoil at the bottom. In a similar way put the outside strip in position. In this way the jar is lined on the inside and covered on the outside one-half way up with tinfoil. When it is found difficult to place the inside pieces of tinfoil with the fingers, an old tooth brush may be used.

Two of the three Leyden jars are connected with the electric machine by placing a wire in contact with each of the collecting combs and allowing it to extend into the jar, one jar being connected with each collecting comb. The outer surfaces of the two jars are connected by a wire. Arranged in this way, the discharge of the sparks from the conductors of the machine does not occur until the jars become charged, when a "fat" spark leaps across with a loud report. This happens as often as the jars become charged. To secure the silent discharge, it is not necessary to disconnect the jars from the machine. All that is required is to disconnect their outside coatings.

The third Leyden jar may be fitted with a large stopper, in the center of which is a metal tube, A, extending down into the jar, as shown in Fig. 1. The lower end of this tube is provided



This apparatus for use in connection with a static machine may be easily constructed by the amateur with a short piece of chain which touches the tinfoil lining of the jar. A wire should be fitted to the tube and a metal ball affixed to the upper end. The jar can be charged by connecting it to the conductors of the machine, one rod touching the ball at the top, the other touching the outer coating of the jar. It may be instantaneously discharged by using the discharger shown in Fig. 6, touching the knob with one ball of the discharger and the outer coating of the jar with the other knob. The jar may be slowly discharged by inserting in the tube *A*, in place of the wire and ball, the end *O* of the wire supporting the chime shown in Fig. 2. This chime has two bells; one is fastened to a crook in the wire at *C* and the other is suspended by a silk thread *G* from a loop *E* formed in the upper end of the wire. This bell should have a chain extending from it downward to the outer coating of the jar or to the support on which the jar rests. Midway between the two bells, a small shot is suspended by a silk thread F from a loop formed in the wire.



The experiments that may be performed with the aid of this apparatus are beautiful and interesting

When the jar is charged, the shot will go to the bell *C* and become charged and repelled, at the same time being attracted by the other bell. When it reaches the second bell, it becomes charged with the opposite kind of electricity, and is repelled and again attracted by the first bell. This operation continues until an equilibrium of electric charge is established between the inside and outside of the jar.

This chime may be used in another way, by employing the jar merely as a support. The chime on the wire *B* is connected with one of the conductors of the machine. The bells will ring as long as the machine is turned.

Fig. 3 illustrates an electric wheel which exhibits how readily static electricity escapes from points and shows its wonderful repellant force. The wheel is readily made by wrapping a piece of thick tinfoil or tea lead H over the heads of two common pins of large size, *I*. The pointed ends of the pins are turned in opposite directions and an indentation is made in the center of the tinfoil to receive the pointed end of the wire *K*, upon which the wheel revolves. Place the wire K in the tube A of the jar, and connect it with the machine. The wheel will revolve in a direction opposite to the points.

Genuine chain lightning may be exhibited by the glass plates shown in Figs. 4 and 5. The plate in Fig. 4 is four inches wide and six inches long, provided at opposite ends with a binding of tinfoil, applied with shellac varnish. One face of the glass is also coated with shellac varnish, and while it is still wet, iron or brass filings are sprinkled on thickly and allowed to remain until the varnish becomes dry. Most of the metallic particles will then adhere to the glass.

When the tinfoil strips at the opposite ends of this plate are connected with opposite discharge rods of the machine, the discharge takes place in fiery streams and rivulets over the surface of the glass.

In Fig. 5 the glass strip is two inches wide and a foot long. Its ends are provided with tinfoil strips as in the other case, but instead of the metal particles used on the other glass, small squares or discs of tinfoil are placed in a zigzag line, joining the tinfoil at the two ends of the glass. These pieces of tinfoil should be about ⅛ in. in diameter, and the spaces between them should not be more than 1/16 in. When the plate of glass is placed between the conductors of the machine, brilliant sparks are seen in the spaces between the pieces of tinfoil.

The universal discharger shown in Fig. 6 consists of two wires, *L*, each having at their inner end a coil. The coils of these wires are screwed, one after the other, on the end of a well-shellacked handle *M* made of very dry wood. The wires may be turned on the handle so as to extend the discharges more or less as may be desired.

The Technical Adviser

The object of this department is to answer the questions of readers who may experience difficulty in the construction or use of apparatus described in the magazine. The columns are free to all readers whether they are subscribers or not, and questions pertaining to matters electrical or mechanical will be answered in the order in which they are received. If the reader cannot wait for an answer to be published he may secure an immediate answer by mail at a cost of 25 cents for each question.

141. G. S., Cincinnati, Ohio, wishes to know if the model steam turbine described in the February issue can be used to drive a dynamo supplying six small six-volt lamps.

Ans.—While the size of the lamps is not specified, we assume they are of the conventional Christmas tree size, in which case the machine in question should possess ample power for his purpose.

142. T. B. W., Richmond, Ind., asks some questions relative to the steam power plant which was described in the February number, wishing blueprints and further details of the model.

Ans.—As far as we know, there is no description or drawings of this engine other than those appearing in the magazine in existence. The engine is being considered by the U. S. Government for employment in the Army, and we doubt if further details of this or larger models are available. The speed is dependant on several factors, such as the boiler pressure and load. A duplicate valve disc would be necessary to make it reversable, and then the whole valve gear would have to be dismantled to change its direction.

143. H. F., La Crosse, Wis., desires to purchase the rotor and parts for the steam turbine described by Mr. Weed in a recent issue.

Ans.—Castings for this model may be obtained through the Supply Division of the American Society of Experimental Engineers, 33 West 42nd St., New York City. The finished parts are unavailable at present. The horsepower of the machine is dependent upon the pressure under which it is run.

144. W. T., West Chesire, Conn., is in need of a few gears for a model.

Ans.—We suggest that you communicate with the Boston Gear Works, of that city, who can undoubtedly supply your wants.

145. L. F. S., Middletown, Md., wishes prices on parts for the Transatlantic Receiving Set described in Mr. Parcent's book. We regret to advise that due to the Government ban on the use of wireless during the period of the war, no wireless apparatus parts may now be sold.